Radiometer • Photovoltaic
MODEL 10.0

A Hand Held Digital PV Radiometer
with Integral Sensor

Applications
- Sun Irradiance Metrology
- Solar PV Panel Input Rays
- PV Array Power Estimate

Features and Benefits
- Hand Held Integral Sensor
- Accurate Calibration
- WRR Traceable
- Compact and Durable
- LCD Readout

Sensor
Silicon Photodiode packaged in hermetically sealed glass window cap.

Meter Operation
To operate your Solarmeter, aim the sensor window located on the top panel of the meter directly at a light source.

Press and hold the push-button switch on the face of the meter. For best results take note of the distance the reading was taken from the source in order to ensure repeatable results.

Battery operation voltage is viable from 9V down to 6.5V. Below 6.5V the numbers on the LCD display will begin to dim indicating the need for battery replacement. Under typical service load a standard 9V battery will last around 2 years.

Proper Usage of Solarmeter® Photovoltaic Radiometer
- Wear tinted eyewear or sunglasses when checking intense sunlight.
- Aim sensor directly at sun to see maximum solar irradiance as a reference.
- Aim sensor in same direction as PV panel to see irradiance striking array.
- Re-orient PV panel direction if desired for best average position.
- Maximum solar noon direction will vary throughout the year.
- Do not subject the meter to extremes in temperature, humidity, shock or dust.

SOLAR® LIGHT

SOLARMETER® • UVMINDER®
MULTIPORT® • MICROTOPS®

(ES) Equipements Scientifiques SA - Département Bio-Tests & Industries - 127 rue de Buzenval BP 26 - 92380 Garches
Tél. 01 47 95 99 90 - Fax. 01 47 01 16 22 - e-mail: bio@es-france.com - Site Web: www.es-france.com

- Use a dry, soft cloth to clean the instrument. Keep sensor free of oil, dirt, etc.

Proper Estimation of PV Panel Power

Before beginning determine the following information from the manufacturer of the module array:

- Effective active area for the PV cells in square meters _____
- PV cells efficiency as percentage of input to output power_____%
- DC to AC conversion efficiency of the PV cell modules in the array _____ %
- Record the temperature near the back of the array _____°C

It is best to do this when sun is directly shining on module near noon. Angles 35° and greater from the sun will increase the % error the meter experiences for these kinds of readings.

Example Calculation with PV Meter reading 1000 W/m² perpendicular to 10 m² array at 10 m² active area, 14% cells efficiency, 95% converter efficiency, 40° C:

- Effective active area for the PV cells in square meters 10 m²
- PV cells efficiency as percentage of input to output power 14 %
- DC to AC conversion efficiency of the PV cell modules in the array 95 %
- Record the temperature near the back of the array 40 °C
- Solarmeter Model 10.0 PV Reading 1000 W/m²

  (1000 W/m²) x (10 m²) = 10000 W incoming sun power

  (10000 W) x (0.14) cell efficiency = 1400 W

  (1400 W) x (0.95) conversion efficiency = 1330 W

Typical temperature coefficient loss for PV cells is -0.5%/°C above 25°C

40°C – 25°C = 15°C; (15°C) x (0.5%/°C) = 7.5% or 92.5% efficiency

(1300W) x (0.925) = 1230.25

A small wiring and component loss of ~1% reduces PV output down to ~1218 W.

Energy Production over Time

The above 1218 Watts value is an "instantaneous" number. Energy is measured in Watt-hours (Wh) or kilowatt hours (kWh) so if the solar irradiance remained constant for an hour near noon, the energy produced would be 1218 Wh.

To estimate power over the entire day take readings every hour and apply the calculations above. Then add up each hour's value x number of hours for daily Watt-hours. Expect the value to increase during the summer and decrease during the winter.

SM/Sensors/Model 10.0 PV_09/2015

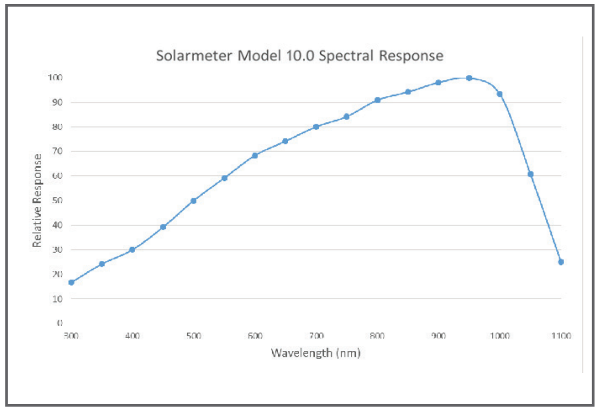

Fig. 1. Model 10.0 Spectral Response

Specifications	
Irradiation Range	0-1999 W/m²
Response	400-1100nm
Resolution	1 W/m²
Conversion Rate	3.0 Readings/Sec
Display	3.5 Digit LCD
Digit Size	0.4 inch High
Operation Temperature	32° F to 100° F
Operation Humidity	5% to 80% RH
Accuracy	±10% to WRR Ref.
Dimensions	4.2L x 2.4W x 0.9D (in.)
Weight	4.5 OZ. (Including Battery)
Power Source	9-Volt DC Battery

Ordering Information	
Model 10.0	PV Radiometer

(ES) Equipements Scientifiques SA - Département Bio-Tests & Industries - 127 rue de Buzenval BP 26 - 92380 Garches
Tél. 01 47 95 99 90 - Fax. 01 47 01 16 22 - e-mail: bio@es-france.com - Site Web: www.es-france.com